

CLAIMS

What is claimed is:

- 1 1. A method of forming high aspect ratio copper structures, comprising;
2 depositing a photoresist;
3 performing a reactive ion etch (RIE) process to form a trench;
4 depositing Cu;
5 performing single chemical mechanical polishing (CMP) process to remove
6 selected amounts of said photoresist and Cu.
- 1 2. A method as in claim 1 wherein said single CMP is performed using a slurry
2 comprising: SiO₂, Ammonium Persulfate, and Benzotriazole (BTA).
- 1 3. A method as in claim 1 further comprising depositing Al₂O₃.
- 1 4. A method as in claim 1 further comprising depositing a SiO₂ hard mask, and
2 wherein said CMP process removes said hard mask material at substantially the same rate
3 as said photoresist, and Cu.
- 1 5. A method as in claim 1 further comprising depositing a Ta barrier layer, and
2 wherein said CMP process removes said Ta at substantially the same rate as said
3 photoresist, and Cu.

- 1 6. A method for forming a Cu coil for use in a magnetic head, comprising:
 - 2 Forming a magnetic pole structure;
 - 3 depositing a photoresist;
 - 4 depositing a hard mask;
 - 5 patterning said hard mask to define a coil pattern;
 - 6 performing a material removal process to form at least one trench according to
 - 7 said coil pattern;
 - 8 depositing Ta
 - 9 depositing Cu; and
 - 10 performing a chemical mechanical polishing (CMP) process using a slurry
 - 11 comprising:
 - 12 Amonium Persulfate, Benzotriazole (BTA), and SiO₂.

- 1 7. A method as in claim 6, wherein said depositing Cu includes sputter depositing a
- 2 seed layer of Cu and then electroplating Cu.

- 1 8. A method as in claim 6 further comprising adjusting a ratio of Ammonium
- 2 Persulfate and Benzotriazole (BTA) so that said CMP process removes material from said
- 3 photoresist, hard mask, Ta, and Cu at substantially the same rate.

- 1 9. A method as in claim 6 further comprising forming a magnetic pedestal and a
- 2 magnetic back gap extending from said pole structure and wherein a portion of

3 said photoresist is deposited between said magnetic pedestal and said magnetic
4 back gap.

1 10. A method as in claim 10, wherein said magnetic pedestal and said back gap
2 comprise NiFe.

1 11. A method as in claim 6, further comprising performing said CMP process
2 sufficiently to form a substantially planar surface including said photoresist, and
3 said Cu.

1 12. A method as in claim 6 further comprising performing said CMP process
2 sufficiently to form a substantially planar surface including said photoresist, said
3 Cu and said Ta.

1 13. A method as in claim 6, further comprising hard baking said photoresist before
2 performing said material removal process.

1 14. A method as in claim 6 wherein said material removal process comprises reactive
2 ion etching (RIE).

1 15. A method as in claim 6 further comprising depositing alumina (Al_2O_3).

1 16. A method as in claim 6

2 further comprising:
3 forming a magnetic pedestal and a magnetic back gap extending
4 from said pole structure; and
5 depositing alumina (Al_2O_3) and wherein:
6 a portion of said photoresist is deposited between said
7 magnetic pedestal and said magnetic back gap; and
8 said material removal process removes said material from
9 said magnetic pedestal, magnetic back gap, photoresist, hard mask,
10 Ta, alumina and Cu at substantially the same rate.

1 17. A slurry for use in chemical mechanical polishing, comprising:
2 SiO_2 ;
3 Amonium Persulfate $((\text{NH}_4)_2\text{S}_2\text{O}_8)$; and
4 Benzotriazole BTA.

1 18. A method of forming a small Cu structure, comprising:
2 depositing a photoresist;
3 performing a material removal process form a cavity in said photoresist;
4 depositing Cu; and
5 performing a chemical mechanical polishing process using a slurry comprising:
6 SiO_2 Ammonium Persulfate, and Benzotriazole (BTA).